DRAFT Compensatory Mitigation Plan

For

Port Arthur Liquefaction Project

Located in

JEFFERSON COUNTY, TEXAS

Prepared for:

Port Arthur LNG, LLC
2925 Briar Park Drive Suite 900
Houston, TX 77042

July 2016

TBS Project Number 2015.0077

Prepared by:

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EXECUTIVE SUMMARY

Port Arthur LNG, LLC (PALNG) is proposing to site, construct, and operate the Port Arthur Liquefaction Project (Project). The project will be located on a site currently owned by Port Arthur LNG Holdings, LLC, approximately five miles south of the intersection of State Highway (SH) 87 and SH 82 near the City of Port Arthur, Texas, south of the Gulf Intracoastal Waterway and along the western side of the Port Arthur Canal, which is part of the Sabine-Neches Waterway system. The Project will be located on substantially the same site that was previously evaluated and approved by the US Army Corps of Engineers (USACE) and other agencies in 2006 as an LNG import terminal under Department of Army Permit 23234.

The proposed project area is comprised of a variety of habitats including open water, previously permitted dredge spoil placement cells, low quality coastal type wetlands, and uplands.

PALNG has prepared the Draft Compensatory Mitigation Plan as permittee responsible mitigation in order to compensate for the unavoidable impacts to 771.9 acres of wetlands associated with the proposed Project. PALNG proposes to beneficially use approximately 2.4 million yd^3 of dredged material for the restoration of 1258.2 acres of tidally influenced coastal marsh. The dredged material will be placed within the JD Murphree Wildlife Management Area Salt Bayou Unit 16, in an area known as the Pintail Flats.

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1.0 INTRODUCTION

Port Arthur LNG, LLC (PALNG) is proposing to site, construct, and operate the Port Arthur Liquefaction Project (Project). The project will be located on a site currently owned by Port Arthur LNG Holdings, LLC, approximately five miles south of the intersection of State Highway (SH) 87 and SH 82 near the City of Port Arthur, Texas, south of the Gulf Intracoastal Waterway and along the western side of the Port Arthur Canal, which is part of the Sabine-Neches Waterway system. The Project will be located on substantially the same site that was previously evaluated and approved by the US Army Corps of Engineers (USACE) and other agencies in 2006 as an LNG import terminal under Department of Army Permit 23234. The import terminal permitted under 23234 was never built. The natural gas will be cooled into a cryogenic liquid form and stored in three 160,000 cubic meter (m^3) full containment LNG storage tanks. The maximum proposed production capacity of the liquefaction process will be approximately 12 million tonnes per annum (MTPA) or 6 MTPA per train. A marine facility capable of berthing two LNG vessels will be constructed to transfer LNG onto ships.

The proposed project area is comprised of a variety of habitats including open water, previously permitted dredge spoil placement cells, low quality coastal type wetlands, and uplands. A map depicting the local area is included in Attachment A.

Port Arthur LNG has prepared the Draft Compensatory Mitigation Plan as permittee responsible mitigation in order to compensate for the unavoidable impacts to 771.9 acres of wetlands associated with the Project.

2.0 OBJECTIVES

The PALNG Compensatory Mitigation Plan will provide a means to mitigate for the loss of function of 771.9 acres of wetlands located on the project site.

Impacts to wetlands from the proposed project were calculated based on wetland acreage determinations conducted on the property in accordance with procedures outlined in the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region*. A wetland delineation was conducted on the project site in August 2014. An Approved Jurisdictional Determination was received from the USACE on January 15, 2016.

Table 1. Wetlands Affected by the Port Arthur LNG Project

Wetland Type	Impact Type		
	Temporary	Permanent	Total
Palustrine Emergent (PEM)	47.0	333.0	380.0
Palustrine Scrub-Shrub (PSS)	53.0	417.7	470.7
Estuarine Emergent	0.0	21.2	21.2
Total	**100.00**	**771.9**	**871.9**

Port Arthur LNG is proposing to restore approximately 1153.2 acres of coastal marsh in an area within the

JD Murphree Wildlife Management Area (WMA) Salt Bayou Unit 16 known as the Pintail Flats. The proposed mitigation area is located within the Sabine Lake Watershed (HUC 12040201).

The proposed mitigation area is part of the Salt Bayou ecosystem, which is the largest contiguous estuarine marsh complex in Texas. The area has degraded over recent years, due in part to the dredging of the Gulf Intracoastal Waterway and the Sabine-Neches Waterway, which has limited freshwater inflow and increased salt water inflow into the system. Potential for sea-level rise and the lack of new sediment also contributes to the long term vulnerability of the area.

The proposed marsh creation area will provide 1153.2 acres of coastal wetland habitat within an area that has been degrading in recent years. The dredge material will recreate coastal marsh that has been lost and nourish the existing marsh with new sediment.

3.0 SITE SELECTION

Onsite mitigation is not feasible since the affected lands are being permanently taken. Near-site mitigation through creation or enhancement of emergent wetlands is a viable option and would result in mitigation suited to the ecology of the project area. Based on previous comments and recommendations of the resource agencies, the JD Murphree WMA was chosen for the proposed marsh restoration site.

The nearby JD Murphree WMA continues to lose marsh each year. Previous LNG projects have proved that proposed spoil placement is beneficial to enhance marsh to baseline conditions. Spoil placement to enhance marsh at the JD Murphree WMA is welcomed by WMA personnel who work daily to protect the natural resources found in the area.

4.0 SITE PROTECTION INSTRUMENT

The proposed mitigation site is located on the JD Murphree Wildlife Management Area on property managed by the Texas Parks and Wildlife Department (TPWD) and owned by the State of Texas. Once the proposed mitigation project is complete, the area will continue to be managed by the TPWD. Ownership by the State of Texas, along with the TPWD management, will ensure the long term protection of the site from future development.

5.0 BASELINE INFORMATION

5.1 Proposed Liquefaction Facility

The project site was historically a brackish coastal marsh which, beginning in the early 1900's, was utilized for placement of dredged material during the construction of the Sabine-Neches Waterway. Due to the spoil placement the project site was raised in elevation and the wetland habitat quality was altered. Typical brackish marsh vegetation was replaced with vegetation associated with disturbed, non-tidal areas. The current dominant species on the site are annual marsh-elder (Iva annua) and common reed (Phragmites australis) which tend to act as invasive in this particular area. Wetlands not covered with the above mentioned species are dense with chinese tallowtree (Triadica sebifera), a listed invasive species. There

is only one 21.2 acre section within the project footprint that reflects the species and characteristics of a typical tidal brackish marsh; however, the area of brackish marsh has also been altered by the construction of a bulkhead on the adjacent property.

5.2 Proposed Mitigation Site

The proposed mitigation site consists of coastal brackish marsh that is primarily comprised of salt-meadow cord grass (*Spartina patens*). Approximately 48 percent of the site consists of open water greater than 1.5 feet deep. Data on the site was obtained from previous field data collection efforts by T. Baker Smith, LLC (TBS) in 2007 as well as Ducks Unlimited in 2011 and 2009. TBS conducted a site visit on May 24, 2016 to obtain additional information on the habitat type in the area.

6.0 DETERMINATION OF CREDITS

The project is located within the boundaries of the jurisdiction of the United States Army Corps of Engineers (USACE), Galveston District. While the Galveston District has approved the SWG Tidal Fringe interim HGM model for assessing impacts to tidal fringe wetlands, there is currently no non-tidal coastal marsh model approved for use in the district. The determination of tidal wetland credits was conducted by utilizing only the iHGM model, since the model is approved for use within the Galveston district. As recommended by the Galveston District, a compilation of models were considered in order to get an accurate credit ratio for the remainder of the proposed project impacts. The Models that were used in the analyses included: SWG Tidal Fringe interim HGM (iHGM), Regional Tidal HGM (HGM), Louisiana Wetland Rapid Assessment Method (LRAM), Texas Rapid Assessment Method (TXRAM), Uniform Mitigation Assessment Method (UMAM), and Wetland Value Assessment (WVA). Each of these models have been selected because of their use along the Gulf Coast and/or their approval in nearby USACE Districts. A description of the results of each model as well as the overall results are described below.

6.1 SWG Tidal Fringe iHGM

In October 2008 the Galveston District approved the interim Hydrogeomorphic Approach (iHGM) for assessing wetland functions. The *SWG tidal fringe iHGM* is to be used for tidal fringe wetlands that exceed three acres in size. The result obtained as a result of the model is a number called a functional capacity index (FCI). The FCI is a quantitative number that relates the capacity of a wetland to perform a function as it relates to the adjacent water body and is calibrated to other wetlands in the region and subclass. FCIs are then calculated into functional capacity units (FCU) by multiplying the FCI by the number of acres impacted. Each function impacted must be accounted for with the same or greater amount of FCUs for each respective function compensated.

The iHGM model was completed for both the tidal estuarine wetland impacts on the project site and the non-tidal wetland impacts. The results of the iHGM for the tidal estuarine wetlands on site is depicted in Table 2 and Table 3 below.

Table 2. iHGM Results of Project Impacts to Tidal Estuarine Wetlands

Function	Pre-project FCUs	Post Project FCUs	Net Gain/Loss
Biota	20.44	0	-20.44
Botanical	19.08	0	-19.08
Physical	13.57	0	-13.57
Chemical	2.86	0	-2.86

Table 3. iHGM Results of Mitigation Area for Impacts to Tidal Estuarine Wetlands

Function	Pre-project FCUs	Post Project FCUs	Net Gain/Loss	FCUs/acre created	Acres of Mitigation Required
Biota	97.3	117.8	20.4	0.36	57.2
Botanical	28.6	57.2	28.6	0.50	38.2
Physical	30.91	49.2	18.3	0.32	42.4
Chemical	14.3	28.6	14.3	0.25	11.5

The USACE, Galveston District's Standard Operating Procedure for using the iHGM to determine potential wetland functions and the appropriate compensatory mitigation for unavoidable wetland impacts states that the same or greater amount of FCUs for each respective function must be compensated. The greatest mitigation amount required for compensation of losses of tidal estuarine wetlands is the Biota Function at 57.2 acres.

The results of the iHGM for the non-tidal wetlands on site is depicted in Table 4 and Table 5 below.

Table 4. iHGM Results of Project Impacts to Non-Tidal Wetlands

Function	Pre-project FCUs	Post Project FCUs	Net Gain/Loss
Biota	248.4	0	-248.4
Botanical	174.97	0	-174.97
Physical	452.11	0	-452.11
Chemical	0.00	0	0.00

Table 5. iHGM Results of Mitigation Area for Impacts to Non-Tidal Wetlands

Function	Pre-project FCUs	Post Project FCUs	Net Gain/Loss	FCUs/acre created	Acres of Mitigation Required
Biota	2401.8	2906.5	504.6	0.36	695.4
Botanical	706.4	1412.9	706.4	0.50	349.9
Physical	762.9	1215.1	452.1	0.32	1412.9
Chemical	353.2	706.4	353.2	0.25	0.0

The greatest mitigation amount required for compensation of losses of non-tidal wetlands is the Physical Function at 1412.9 acres. Dividing the amount of mitigation required (1412.9 acres) by the overall non-tidal wetland impact for the project (750.7) results in a compensatory mitigation to acreage of impact ratio of 1.88 to 1.

6.2 Regional Tidal HGM

The *Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Northwest Gulf Of Mexico Tidal Fringe Wetlands* (Regional Tidal HGM) was approved in April 2002 to assess wetlands in the Northwest Gulf of Mexico Tidal Fringe Wetlands. It was developed to be used along with the Clean Water Act Section 404 Regulatory permit review sequence to aid in assessing wetlands.

The Regional Tidal HGM model scores fourteen variables within nine functional assessment categories which are used in an assessment model to produce FCIs ranging from 0.0 – 1.0. A summary of results is included in Table 6 and the complete results of the calculations are included in Attachment C. The values for each function are calculated and the pre-project value minus the post project value denotes the FCUs that will either be impacted at the project site or will be created through marsh enhancement.

For the Regional Tidal HGM model calculation a potential mitigation area of 1900 acres was chosen to represent the mitigation area. Upon final calculations, it was determined that a total of 1793.2 acres of mitigation would be required to offset the impacts of the proposed project. Dividing the amount of mitigation required (1793.2 acres) by the overall non-tidal wetland impact for the project (750.7) results in a compensatory mitigation to acreage of impact ratio of 2.39 to 1.

Table 6. Regional Tidal HGM – Summary of Results

	Project Site	Mitigation Site		
Function	**FCUs**	**Pre-project FCUs**	**Post Project FCUs**	**Net Gain FCU**
Shoreline Stabilization	619.5	1178.0	1634.0	456.0
Sediment Deposition	0.0	1343.5	1900.0	556.5
Nutrient and Org C Exchange	0.0	1900.0	1900.0	0.0
Resident Nekton Utilization	110.1	1710.0	1845.7	135.7
Nonresident Nekton Utilization	0.0	1802.5	1872.7	70.2
Maintain Invert Prey Pool	295.6	1520.0	1900.0	380.0
Provide Wildlife Habitat	499.2	1472.5	1710.0	237.5
Maintain Char Plant Com	174.96	1140.0	1900.0	760.0
Plant Biomass Production	750.7	1900	750.7	0.0
Total	**2450.0**	**13,966.5**	**15,413.1**	**2595.9**
FCUs per Acre Created	**1.37**			
Total Acres of Mitigation Required	**1793.2**			

6.3 Louisiana Wetland Rapid Assessment Method

In February of 2016 the USACE, New Orleans District released the Louisiana Wetland Rapid Assessment Method (LRAM). LRAM bases its wetland value on ecological conditions rather than ecological functions or societal values. It is designed to achieve rapid and repeatable calculations of compensatory mitigation requirements by users with various backgrounds. LRAM was developed for all habitat types found within the New Orleans District. The use of the LRAM for the proposed project site is justifiable due to the close proximity and similarity of the site to the New Orleans District wetlands.

The five factors utilized by the LRAM to calculate mitigation credits are mitigation type, management, negative influences, size, and buffer/upland. The mitigation potential per acre is calculated by summing all factors and then multiplying by the number of acres to acquire the amount of LRAM credits. The LRAM can also be utilized to determine the amount of ecological lift at a given site.

Similarly to the Regional Tidal HGM model calculation, a potential mitigation area of 1900 acres was chosen to represent the mitigation area. Upon final calculations, it was determined that a total of 743.6 acres of mitigation would be required to offset the impacts of the proposed project. Dividing the amount of mitigation required (743.6 acres) by the overall non-tidal wetland impact for the project (750.7) results in a compensatory mitigation to acreage of impact ratio of 0.99 to 1.

Table 7. LRAM – Summary of Results

Sum of Values			
Project Site	**Mitigation Site**	**Credits per Acre Enhanced**	**Total Acres of Mitigation Required**
4461.6	11,400.0	6.0	743.6

6.4 Texas Rapid Assessment Method

The Texas Rapid Assessment Method (TXRAM), Version 2 was approved on September 2015 for use in the Fort Worth District to provide a rapid assessment method for evaluating the ecological condition of wetlands and streams. The TXRAM model contains 18 metrics for assessing observable characteristics of a wetland which are organized into five core elements. The TXRAM score is calculated by summing the core element scores and rounding to the nearest whole number, with a maximum of 100. The score for each element can be calculated by adding the metric scores for that core element and dividing by the total maximum possible score for those metrics, then multiplying by a specified number shown on the data sheet and then rounded to the nearest tenth. The maximum score can be increased by additional points for unique resources and limited habitats ending in a total overall TXRAM score of 115. The wetland assessment area score can then be input into the TXRAM workbook and a mitigation required credit is obtained. The required credit divided by the acres being impacted gives the acreage of mitigation needed.

For this project the TXRAM was completed for four different habitat types to account for wetlands with or without invasive species.

Table 8. TXRAM – Summary of Results

Habitat Type	Acres of Mitigation Required
PEM without invasive species	260.26
PEM with invasive species	376.11
PSS without invasive species	395.81
PSS with invasive species	437.89
TOTAL	1470.07

The data sheets associated with the calculation in Table 8 are attached in Attachment E. Dividing the amount of mitigation required (1470.1 acres) by the overall non-tidal wetland impact for the project (750.7) results in a compensatory mitigation to acreage of impact ratio of 1.96 to 1.

6.5 Uniform Mitigation Assessment Method

The Uniform Mitigation Assessment Method (UMAM) was developed by the University of Florida Center for

Wetlands and became effective in February 2004. The UMAM is designed to assess impacts as well as mitigation for wetlands. There are two sections to this assessment method, the qualitative and the quantitative. The qualitative portion includes items researched in the office and gives a frame of reference to the community being evaluated. The UMAM utilizes aerials and topographic maps to better understand the project site and adjacent properties to obtain a better understanding of the wetland before going in the field. The quantitative section evaluates sites according to three criteria which are scored on a scale from 0 to 10, with 10 being minimally impaired. The three categories include Location and Landscape Support, Water Environment, and Community Structure. The end result of the quantification assessment is a score for Functional Loss (FL) or Relative Functional Gain (RFG). The RFG multiplied times acreage is equal to the credits created by the project. The sum of all FLs is the number of credits needed for mitigation. The Functional Loss (200.2) divided by the Functional Gain (0.26) is equal to 760.7 acres. Dividing the amount of mitigation required (760.7 acres) by the overall non-tidal wetland impact for the project (750.7) results in a compensatory mitigation to acreage of impact ratio of 1.01 to 1.UMAM Data sheets are located in Attachment F.

Table 9. UMAM – Summary of Results

Functional Loss	Relative Functional Gain	Acres of Mitigation Required
200.2	0.26	760.7

6.6 Wetland Value Assessment

The wetland value assessment (WVA) methodology is a quantitative based assessment method for determining the benefits of wetland projects submitted for funding under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The WVA quantifies changes in fish and habitat quantity and quality through the use of community models developed specifically for each habitat. The WVA end result is an Average Annual Habitat Unit (AAHU). The AAHUs for the marsh enhancement area are then divided by the total acreage (695.9/1900) and this results in 0.37 credits per acre. The AAHUs for the project area can then be divided by the credits per acre and the result is acres needed (365.03/0.366= 1038.1 acres). The data sheets used to determine the AAHUs can be found in Attachment G. A summary of the results of the WVA for the non-tidal wetlands on site is depicted in Table 10.

Table 10. WVA – Summary of Results

	Emergent Marsh Habitat Net AAHUs	Open Water Habitat Net AAHUs	Net Benefits
Project Site	-565.18	8.14	-380.24
Mitigation Site	1100.43	-355.85	695.91
AAHUs per Acre Created		0.37	
Total Acres of Mitigation Required		1038.1	

6.7 Overall Results

The overall results of each wetland assessment method outlined above were converted to a ratio of wetland restoration acres required per acre of impact. Table 11 below outlines the results of the six wetland assessment methods.

Table 11. Ratio of Mitigation Acreage Required for the Port Arthur Liquefaction Project

	Method					
	IHGM	**HGM**	**LRAM**	**TXRAM**	**WVA**	**UMAM**
Ratio Required*	1.88	2.39	0.99	1.96	1.38	1.01
Average Ratio Required	1.60					

*Ratio of mitigation acreage required per one acre of impact.

Utilizing the results above, an average ratio of mitigation required was calculated. The loss of 750.7 acres of wetlands at the project site would require 1201.0 acres of marsh restoration at the Pintail Flats. The loss of 21.2 acres of tidal wetlands would require an additional 57.2 acres of marsh creation for a total compensatory mitigation amount of **1258.2** acres.

7.0 MITIGATION WORK PLAN

Compensatory mitigation will be required to offset the loss of wetlands incurred by the proposed project. The following mitigation work plan for the creation of 1258.2 acres of brackish marsh shall serve as compensatory mitigation to offset the loss of 770.7 acres of wetland habitat due to the construction of the proposed Port Arthur Liquefaction Project. PALNG proposes to place dredge material in areas of open water and broken coastal marsh within a 1,900 acre area of the JD Murphree Wildlife Management Area (WMA). The beneficial use project will utilize approximately 2.4 million cubic yards of dredged material generated from construction of the proposed marine terminal ship berths and place the material on the WMA managed by the Texas Parks and Wildlife Department (TPWD). In the WMA, sections of the marsh are converting to shallow open water areas due both to the loss of influx of freshwater and to salt water intrusion. Expansion of the open water areas increases as wave erosion develops with the creation of additional open water ponds. PALNG has consulted with WMA staff in identifying areas of concern. Based on recommendations from the WMA staff, PALNG proposes to fill an area of degraded marsh that will aid in the reestablishment of emergent wetlands in Salt Bayou Unit 16, an area locally known as Pintail Flats, as shown in Attachment A.

Restoration of the marsh within the WMA will be accomplished by filling the degraded marsh areas in the Pintail Flats with dredged material to an elevation conducive to the establishment of marsh as indicated by geotechnical analysis and then monitoring the success of natural re-vegetation with the goal of obtaining 80 percent coverage of native emergent vegetative species after five years.

The proposed discharge pipe route will be located from the marine berth across PALNG property to an existing canal on the WMA. The discharge pipe will be temporarily installed within the canal and then maneuvered into the dredge disposal area at locations to be field determined in coordination with WMA

staff. The target level of fill will be established by geotechnical analysis of anticipated settling and compaction. Final elevation targets will not exceed mean higher high water (MHHW). The initial elevation of fill will be surveyed, and markers will be set to visually establish the fill heights in each of the target waters for treatment. Mechanized equipment may be utilized during the operation to sweep the materials to remove developing high spots. Containment dikes will be constructed as needed to prevent the dredged material from entering areas outside of the proposed disposal area. The actual amount of area affected by discharge may exceed the 1258.2 acres.

8.0 MAINTENANCE PLAN

Continued maintenance after construction is not planned. Once the material is placed within the WMA, there should be no further maintenance required. If unforeseen maintenance is required, PALNG will consult with TPWD and the USACE to develop a resolution.

9.0 PERFORMANCE STANDARDS

The marsh creation area will be allowed to re-vegetate naturally and monitored for habitat quality and wetland functionality for a period of 20 years. Vegetation surveys will take place during the growing season of years one, three, five, 10, and 20. The vegetation surveys will be used to determine and calculate the vegetation coverage types and percentages. The overall success of the mitigation project will be determined from these surveys. An outline of the success criteria is listed below.

A. Initial Success Criteria (Year 1)

1. Dredge spoil material will be placed at elevations and in manners that are conducive to marsh creation.
2. The marsh creation area will be assessed for vegetative coverage. The marsh establishment creation site should contain at least 20% emergent vegetation coverage.

B. Interim Success Criteria (Year 3)

1. The marsh creation site should contain approximately 75% of emergent wetland vegetation coverage.
2. Containment levees/dikes have been gapped in order to allow hydraulic exchange between the created marsh and adjacent waterbodies.

C. Long Term Success Criteria (Year 5-20)

1. The marsh creation site should contain approximately 80% of emergent wetland vegetation coverage.
2. Observed use of created marsh by wildlife species typically found in natural marsh habitats of similar salinity regime.

10.0 MONITORING REQUIREMENTS

Monitoring reports outlining and identifying the success of the marsh creation site will be submitted to the USACE. These reports will be submitted one, three, five, 10, 15, and 20 years after construction to assess the project's success. One 0.01 acre monitoring station will be established for every 10 acres of marsh created. Monitoring surveys will be conducted between the months of September and October, and the monitoring reports will be submitted in December of the same year. The monitoring reports will include

digital images taken from ground level at each monitoring station. The monitoring reports will consist of five sections as outlined in *USACE Regulatory Guidance Letter no. 08-03, Dated October 10, 2008*. These include:

1. **Project Overview**
    A. USACE permit number
    B. Name of responsible party
    C. Purpose of the project and types of aquatic resources impacted
    D. Project location and description
    E. Dates of project
    F. Statement of performance standards and any corrective measures taken
2. **Requirements**
    A. Identify and discuss performance standards and current state of the mitigation site
    B. Summary of Data
        1. Discuss and provide documentation of the success of the mitigation site
        2. Submit photographs, with their locations, taken during the monitoring event
    C. Maps and Plans
        1. Maps of the proposed compensatory mitigation site and locations of the photographic reference points
        2. Conclusion
            a. Brief statement of the overall conditions of the mitigation project

11.0 LONG-TERM MANAGEMENT PLAN

No long term management associated with the spoil placement is anticipated. TPWD will be responsible for the long term management of the lands contained within the WMA.

12.0 ADAPTIVE MANAGEMENT PLAN

If it is determined during the monitoring process that the vegetation establishment or survival goals are not achieved then a remedial vegetation planting plan will be implemented as outlined below.

12.1 Remedial Plantings

Spartina alterniflora (smooth cordgrass) and *Spartina patens* (marshhay cordrass) sprigs, or an agency preferred alternative, will be obtained from an agency-recognized or approved source of nursery stock. Other species may be included in the planting plan to mimic natural speciation tendencies observed once onsite studies have been completed. If needed, plant stock will be acclimatized for a two-week period prior to transportation to the areas for planting.

If the 20% aerial coverage goal is not met after the first growing season, vegetation will be planted on 20-foot centers in 100-foot rows in the areas of concern.

If the 75% aerial coverage goal is not met after the third growing season vegetation will be planted on 5-foot to 8-foot centers in areas of concern. In areas that adjoin open waters where erosion due to wave action is a potential concern, smooth cordgrass will be planted on 1-foot centers within a 20-foot buffer of the open water areas.

12.2 Remedial Planting Monitoring

A transplant survival survey will be conducted within 60 days of initial planting. If 50% survival is not achieved, a second planting will be initiated within 30 days of initial survey. Written reports detailing plant survival will be submitted to the USACE within 30 days of initial survey completion.

Long term success of the remedial plantings will be monitored as part of the marsh creation monitoring plan.

13.0 FINANCIAL ASSURANCES

Should financial assurances be required by the USACE, PALNG will work with them to identify an appropriate method of financial assurance.

REFERENCES

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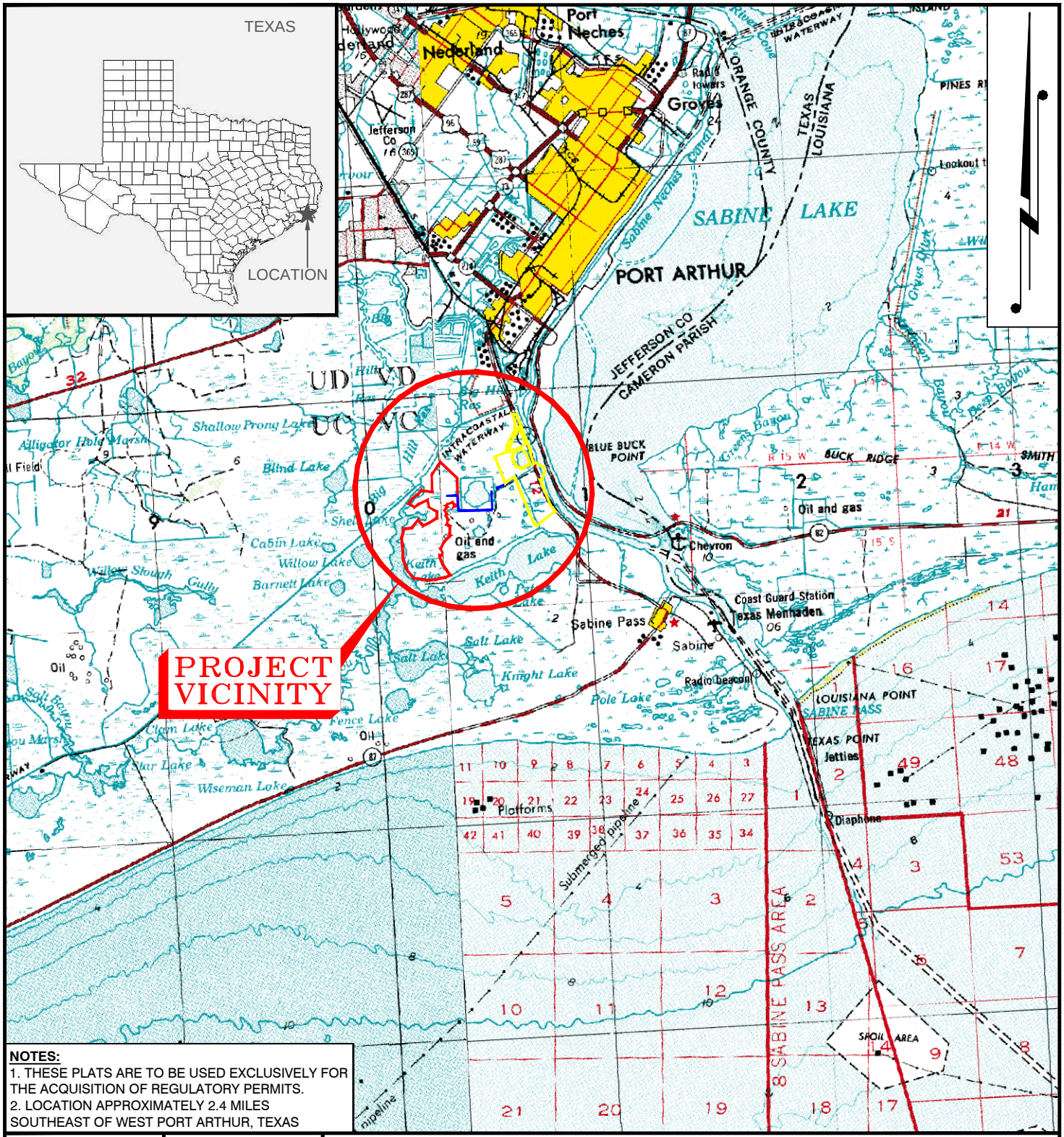
ATTACHMENT A

Project Maps
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texas



NOTES:

1. THESE PLATS ARE TO BE USED EXCLUSIVELY FOR THE ACQUISITION OF REGULATORY PERMITS.
2. LOCATION APPROXIMATELY 2.4 MILES SOUTHEAST OF WEST PORT ARTHUR, TEXAS

DRAWN BY:	RRB	APPROVED BY:	BST
DATE:	07/26/2016	JOB NO:	2015.0077
DRAWING NAME:	20150077_C1.DWG		
SHEET NO:	1	OF	3

PROJECTION: TEXAS SOUTH CENTRAL
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SCALE: 1" = 4 MILES

4 MI 2 MI 0' 4 MI

VICINITY MAP

PORT ARTHUR LNG, LLC

PROPOSED LIQUEFACTION PROJECT
PORT ARTHUR LNG FACILITY
ABSTRACT NOS. 12, 71, 123, 185, 251,
331, 438, 488, 770, 780, & 927
JEFFERSON COUNTY, TEXAS

T. BAKER SMITH
SOLUTIONS START HERE
107 Global Circle, Lafayette, LA 70503
(337)735-2800 - tbsmith.com

REV. NO:	REV. DATE:	REV. BY:
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REVISION DESCRIPTION:
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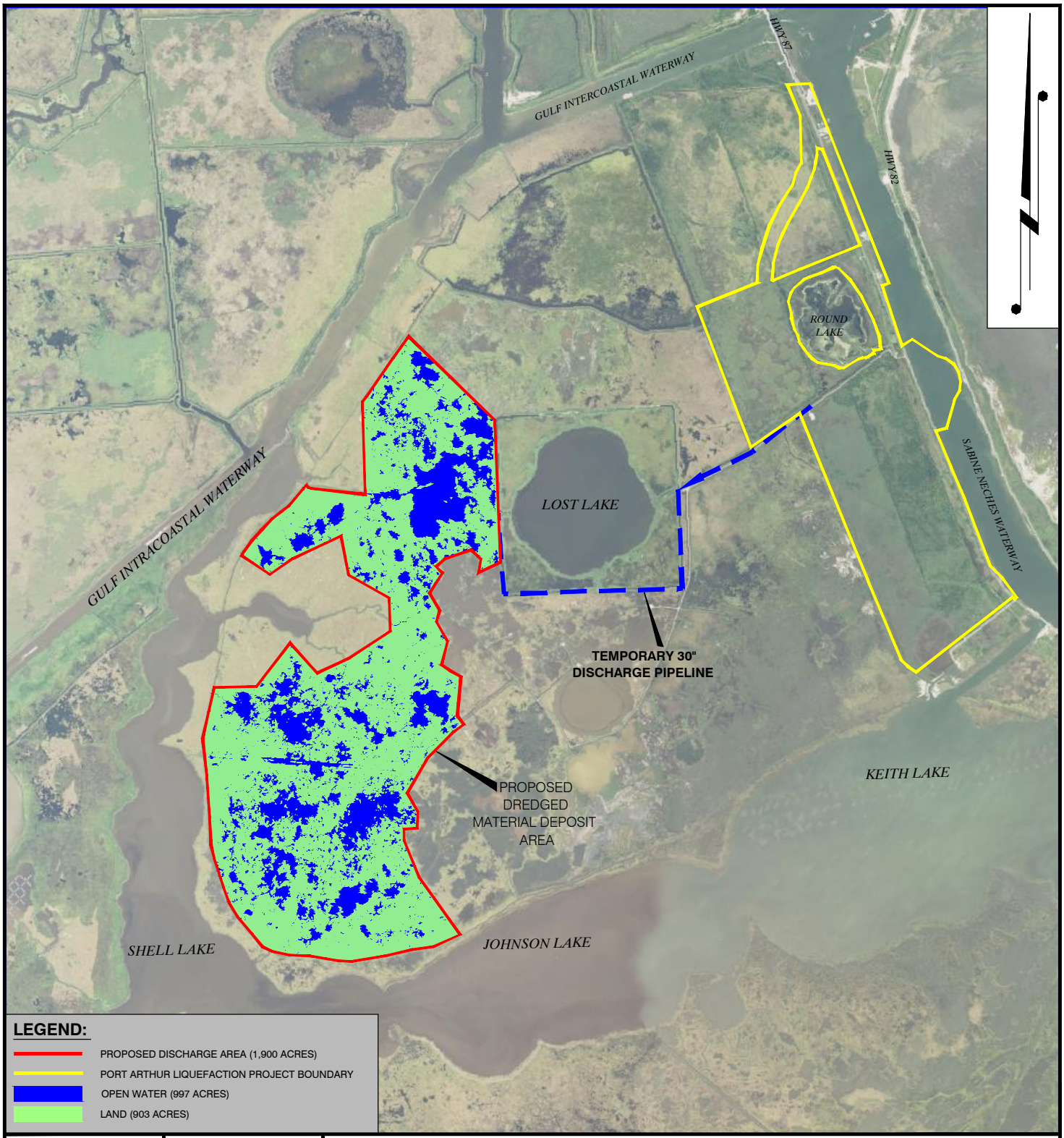
7/26/2016 - P:\Y-2015\2015.0077\DWG\MITAGATION PLATS\20150077_C1.DWG



DRAWN BY:	RRB	APPROVED BY:	BST
DATE:	07/26/2016	JOB NO:	2015.0077
DRAWING NAME:	20150077_C2.DWG		
SHEET NO:	2	OF	3

PROJECTION: TEXAS SOUTH CENTRAL
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SCALE: 1" = 4000'

4000' 2000' 0' 4000'

AREA MAP

PORT ARTHUR LNG, LLC

PROPOSED LIQUEFACTION PROJECT
PORT ARTHUR LNG FACILITY
ABSTRACT NOS. 12, 71, 123, 185, 251, 331, 438, 488, 770, 780, & 927
JEFFERSON COUNTY, TEXAS

PRELIMINARY

T. BAKER SMITH
SOLUTIONS START HERE
107 Global Circle, Lafayette, LA 70503
(337)735-2600 - tbsmith.com

REV. NO:	REV. DATE:	REV. BY:
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REVISION DESCRIPTION:
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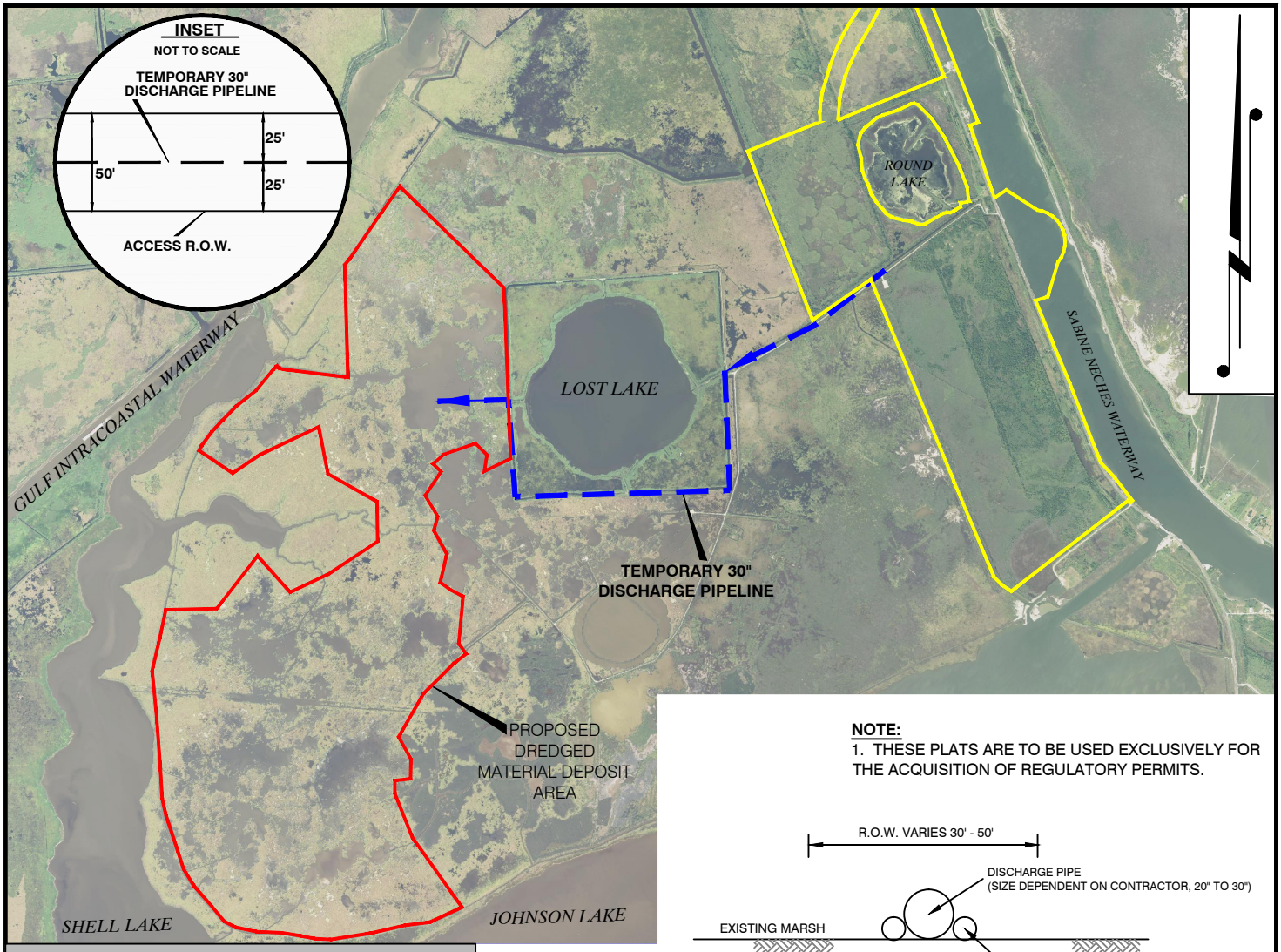
7/28/2016 - P:\Y-2015\2015.0077\DWG\MITAGATION PLATS\20150077_C2.DWG



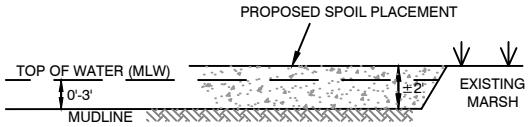
NOTE:
1. THESE PLATS ARE TO BE USED EXCLUSIVELY FOR THE ACQUISITION OF REGULATORY PERMITS.

LEGEND:

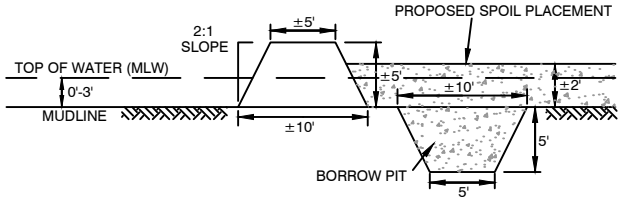
PROPOSED DISCHARGE AREA (1,900 ACRES)
PORT ARTHUR LIQUEFACTION PROJECT BOUNDARY

SPOIL MATERIAL WILL BE PLACED IN A MANNER CONDUCIVE TO MARSH ESTABLISHMENT.
SETTLED FILL ELEVATION WILL NOT EXCEED MHHW.

TYPICAL TEMPORARY PIPELINE ROUTE
NOT TO SCALE



TYPICAL DISPOSAL ADJACENT TO EXISTING MARSH
NOT TO SCALE



TYPICAL RETAINING LEVEE TO SERVE PROPOSED MITIGATION SITES
NOT TO SCALE

DRAWN BY:	RRB	APPROVED BY:	BST
DATE:	07/26/2016	JOB NO:	2015.0077
DRAWING NAME:	20150077_C2.DWG		
SHEET NO:	3	OF	3

PROJECTION: TEXAS SOUTH CENTRAL
GEO. DATUM: NAD83 | VERT. DATUM: NAVD88
GRID UNITS: US SURVEY FEET

SCALE: 1" = 4000'
4000' 2000' 0' 4000'

PROPOSED BENEFICIAL USE OF DREDGED MATERIAL (BUDM)

PORT ARTHUR LNG, LLC

PROPOSED LIQUEFACTION PROJECT
PORT ARTHUR LNG FACILITY
ABSTRACT NOS. 12, 71, 123, 185, 251, 331, 438, 488, 770, 780, & 927
JEFFERSON COUNTY, TEXAS

PRELIMINARY

T. BAKER SMITH
SOLUTIONS START HERE
107 Global Circle, Lafayette, LA 70503
(337)735-2800 - tbsmith.com

REV. NO:	REV. DATE:	REV. BY:
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REVISION DESCRIPTION:
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7/28/2016 - P:\Y-2015\2015.0077\DWG\MITAGATION PLATS\20150077_C2.DWG

ATTACHMENT B

SWG Tidal Fringe interim HGM
Data Sheets and Calculations
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texa

SWG Tidal Fringe HGM (Interim) Worksheet

WAA # Marsh Enhancement Pre

Variable	Subindex
V**edge**	0.8
V**hydro**	1.0
V**nhc**	0.7
V**typical**	0.5
V**slope**	0.1
V**width**	0.5
V**rough**	0.5
V**soil**	0.6

WAA # Marsh Enhancement Post

Variable	Subindex
V**edge**	1.0
V**hydro**	1.0
V**nhc**	0.8
V**typical**	1.0
V**slope**	0.5
V**width**	1.0
V**rough**	1.0
V**soil**	0.8

SWG Tidal Fringe (Interim HGM) Worksheet
Functional Capacity Index (FCI)

Biota:

[{V**edge** + 2 V**hydro** + 0.5V**nhc**/3.5} + V**typical**]/2

Pre: [{ __0.8_ + 2___1.0 + 0.5 x _0.7_ /3.5} + _0.5__]/2 = FCI ;

Post: [{ _1.0__ + 2__1.0_ + 0.5 x _0.8_ /3.5} + __1.0_]/2 = FCI

Botanical:

V**typical**

Pre: __0.5___ = FCI

Post: ___1.0__ = FCI

Physical:

[V**slope** + V**width** + V**rough** + V**soil** + V**hydro**]/5

Pre: [__0.1_ + __0.5_ + ___0.5_ + __0.6__ + ___1.0_]/5 = FCI

Post: [_0.5__ + __1.0_ + ___1.0_ + __0.8__ + __1.0__]/5 = FCI

Chemical:

[V**typical** x V**hydro**]1/2

Pre: [__0.5__ x __1.0_]1/2 = FCI

Post: [__1.0__ x __1.0_]1/2 = FCI

Functional Capacity Units (FCU); FCI x wetland acres per WAA…

WAA#	Pre-project FCUs	Post project FCUs
Biota	1.7	2.057143
Botanical	0.5	1.0
Physical	0.54	0.86
Chemical	0.25	0.5

SWG Tidal Fringe HGM (Interim) Worksheet

WAA # Estuarine Marsh Pre

Variable	Subindex
V**edge**	0.4
V**hydro**	0.3
V**nhc**	0.2
V**typical**	0.9
V**slope**	0.1
V**width**	1.0
V**rough**	1.0
V**soil**	0.8

WAA # Estuarine Marsh Post

Variable	Subindex
V**edge**	0
V**hydro**	0
V**nhc**	0
V**typical**	0
V**slope**	0
V**width**	0
V**rough**	0
V**soil**	0

SWG Tidal Fringe (Interim HGM) Worksheet
Functional Capacity Index (FCI)

Biota:

$[\{V_{edge} + 2\ V_{hydro} + 0.5V_{nhc}/3.5\} + V_{typical}]/2$

Pre: [{ _0.4__ + 2_(0.3) + 0.5 x _0.2 /3.5} + _0.9_]/2 = FCI ;

Post: [{ _0___ + 2_0___ + 0.5 x _0__ /3.5} + __0__]/2 = FCI

Botanical:

$V_{typical}$

Pre: __0.9 __ = FCI

Post: ___0___ = FCI

Physical:

$[V_{slope} + V_{width} + V_{rough} + V_{soil} + V_{hydro}]/5$

Pre: [__0.1 + _1.0_ + __1.0_ + _0.8__ + __0.3___]/5 = FCI

Post: [__0__ + ___0_ + __0___ + __0___ + ___0__]/5 = FCI

Chemical:

$[\ V_{typical}\ x\ V_{hydro}]1/2$

Pre: [_0.9__ x _0.3__]1/2 = FCI

Post: [__0___ x __0__]1/2 = FCI

Functional Capacity Units (FCU); FCI x wetland acres per WAA…

WAA#	Pre-project FCUs	Post project FCUs
Biota	0.96	0
Botanical	0.9	0
Physical	0.64	0
Chemical	0.135	0

SWG Tidal Fringe HGM (Interim) Worksheet

WAA # Emergent – No invasives Pre

Variable	Subindex
V**edge**	0.4
V**hydro**	0
V**nhc**	0.2
V**typical**	0.4
V**slope**	0.5
V**width**	1.0
V**rough**	0.6
V**soil**	0.8

WAA # Emergent – No invasives Post

Variable	Subindex
V**edge**	0
V**hydro**	0
V**nhc**	0
V**typical**	0
V**slope**	0
V**width**	0
V**rough**	0
V**soil**	0

SWG Tidal Fringe (Interim HGM) Worksheet
Functional Capacity Index (FCI)

Biota:

$[\{V_{edge} + 2\ V_{hydro} + 0.5V_{nhc}/3.5\} + V_{typical}]/2$

Pre: [{ _0.4__ + 2__0.0_ + 0.5 x __0.2 /3.5} + _0.2__]/2 = FCI ;

Post: [{ _0___ + 2___0_ + 0.5 x __0_ /3.5} + __0__]/2 = FCI

Botanical:

$V_{typical}$

Pre: ___0.2__ = FCI

Post: ____0__ = FCI

Physical:

$[V_{slope} + V_{width} + V_{rough} + V_{soil} + V_{hydro}]/5$

Pre: [__0.5_ + __1.0_ + _0.6___ + __0.8__ + __0.0__]/5 = FCI

Post: [_0___ + __0__ + __0___ + ___0__ + __0___]/5 = FCI

Chemical:

$[\ V_{typical}\ x\ V_{hydro}]1/2$

Pre: [__0.2__ x __0__]1/2 = FCI

Post: [___0__ x __0__]1/2 = FCI

Functional Capacity Units (FCU); FCI x wetland acres per WAA…

WAA#	Pre-project FCUs	Post project FCUs
Biota	0.414286	0
Botanical	0.4	0
Physical	0.58	0
Chemical	0.0	0

SWG Tidal Fringe HGM (Interim) Worksheet

WAA # Emergent – with invasives Pre

Variable	Subindex
V**edge**	0.4
V**hydro**	0.0
V**nhc**	0.2
V**typical**	0.4
V**slope**	0.5
V**width**	1.0
V**rough**	0.6
V**soil**	0.8

WAA # Emergent – with invasives Post

Variable	Subindex
V**edge**	0
V**hydro**	0
V**nhc**	0
V**typical**	0
V**slope**	0
V**width**	0
V**rough**	0
V**soil**	0

SWG Tidal Fringe (Interim HGM) Worksheet
Functional Capacity Index (FCI)

Biota:

[{V**edge** + 2 V**hydro** + 0.5V**nhc**/3.5} + V**typical**]/2

Pre: [{ _0.4__ + 2_0.0__ + 0.5 x _0.2_ /3.5} + _0.4_]/2 = FCI ;

Post: [{ _0___ + 2___0_ + 0.5 x __0_ /3.5} + __0__]/2 = FCI

Botanical:

V**typical**

Pre: __0.4_ = FCI

Post: ____0__ = FCI

Physical:

[V**slope** + V**width** + V**rough** + V**soil** + V**hydro**]/5

Pre: [_0.5 + _1.0 + _0.6_ + _0.8_ + __0.0]/5 = FCI

Post: [_0___ + __0__ + __0___ + ___0__ + __0___]/5 = FCI

Chemical:

[V**typical** x V**hydro**]1/2

Pre: [_0.4_ x _0.0_]1/2 = FCI

Post: [___0__ x __0__]1/2 = FCI

Functional Capacity Units (FCU); FCI x wetland acres per WAA…

WAA#	Pre-project FCUs	Post project FCUs
Biota	0.414286	0
Botanical	0.4	0
Physical	0.58	0
Chemical	0.0	0

SWG Tidal Fringe HGM (Interim) Worksheet

WAA # Scrub/shrub – No invasives Pre

Variable	Subindex
V**edge**	0.4
V**hydro**	0
V**nhc**	0.2
V**typical**	0.1
V**slope**	0.1
V**width**	1.0
V**rough**	1.0
V**soil**	1.0

WAA # Scrub/shrub – No invasives Post

Variable	Subindex
V**edge**	0
V**hydro**	0
V**nhc**	0
V**typical**	0
V**slope**	0
V**width**	0
V**rough**	0
V**soil**	0

SWG Tidal Fringe (Interim HGM) Worksheet
Functional Capacity Index (FCI)

Biota:

[{V**edge** + 2 V**hydro** + 0.5V**nhc**/3.5} + V**typical**]/2

Pre: [{ __0.4__+ 2_0.0__ + 0.5 x _0.2_ /3.5} + _0.1__]/2 = FCI ;

Post: [{ _0___ + 2___0_ + 0.5 x __0_ /3.5} + __0__]/2 = FCI

Botanical:

V**typical**

Pre: ___0.1__ = FCI

Post: ____0__ = FCI

Physical:

[V**slope** + V**width** + V**rough** + V**soil** + V**hydro**]/5

Pre: [__0.1_ + __1.0_ + _1.0___ + __1.0__ + __0.0__]/5 = FCI

Post: [_0___ + __0__ + __0___ + ___0__ + __0___]/5 = FCI

Chemical:

[V**typical** x V**hydro**]1/2

Pre: [__0.1__ x __0__]1/2 = FCI

Post: [___0__ x __0__]1/2 = FCI

Functional Capacity Units (FCU); FCI x wetland acres per WAA…

WAA#	Pre-project FCUs	Post project FCUs
Biota	0.264286	0
Botanical	0.1	0
Physical	0.62	0
Chemical	0.0	0

SWG Tidal Fringe HGM (Interim) Worksheet

WAA # Scrub-shrub – with invasives Pre

Variable	Subindex
V**edge**	0.4
V**hydro**	0
V**nhc**	0.2
V**typical**	0.1
V**slope**	0.1
V**width**	1.0
V**rough**	1.0
V**soil**	1.0

WAA # Scrub-shrub – with invasives Post

Variable	Subindex
V**edge**	0
V**hydro**	0
V**nhc**	0
V**typical**	0
V**slope**	0
V**width**	0
V**rough**	0
V**soil**	0

SWG Tidal Fringe (Interim HGM) Worksheet
Functional Capacity Index (FCI)

Biota:

[{V**edge** + 2 V**hydro** + 0.5V**nhc**/3.5} + V**typical**]/2

Pre: [{ _0.4__ + 2__0.0_ + 0.5 x __0.2 /3.5} + _0.1__]/2 = FCI ;

Post: [{ _0___ + 2___0_ + 0.5 x __0_ /3.5} + __0__]/2 = FCI

Botanical:

V**typical**

Pre: ___0.1__ = FCI

Post: ____0__ = FCI

Physical:

[V**slope** + V**width** + V**rough** + V**soil** + V**hydro**]/5

Pre: [__0.1_ + __1.0_ + _1.0_ + __1.0__ + __0.0__]/5 = FCI

Post: [_0___ + __0__ + __0___ + ___0__ + __0___]/5 = FCI

Chemical:

[V**typical** x V**hydro**]1/2

Pre: [__0.1__ x __0__]1/2 = FCI

Post: [___0__ x __0__]1/2 = FCI

Functional Capacity Units (FCU); FCI x wetland acres per WAA…

WAA#	Pre-project FCUs	Post project FCUs
Biota	0.264286	0
Botanical	0.1	0
Physical	0.62	0
Chemical	0.0	0

ATTACHMENT C

Regional Tidal HGM
Data Sheets and Calculations
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texas

Regional Tidal HGM
Port Arthur Liquefaction Project

Project area: Marsh Enhacement

	Pre	Post	Comments
Vslope	0.5	0.5	A distance of >50 meters must be reached to acquire water depths of 2 meters.
Vwidth	0.5	1.0	Avg marsh width is 41 meters.
Vexpose	1.0	1.0	Exposure Index is = 2.04 Mitigation site has a barrier of vegetation protecting it from wind generated waves.
Vrough	0.5	1.0	Pre-project is scored 0.025 for bare marsh, 0.01 for tidal channels and ridges, and 0.03 for 50% vegetation. Post-project is scored 0.025 for bare marsh, 0.01 for tidal channels and ridges, and 0.07 for approx 100% vegetation.
Vsoil	0.6	0.8	Pre-project contains loamy soils while Post-project will contain more clay.
Vedge	0.8	1.0	Pre-preoject marsh is deteriorated with large open water areas. Post project will be mostly marsh with a well developed drainage network.
Voma	1.0	1.0	The mitigation area contains .50 of tidally connected edge.
Vsize	1.0	1.0	Area provides a continuous corridor for animal traverse.
Vhydro	1.0	1.0	Site is open to tidal waters.
Vnhc	0.7	0.8	Pre-project site contains subtidal creeks/low marsh/ponds and SAV's. Post project site will contain subtidal and intertidal creeks with ponds, low marsh and SAV's.
Vtypical	1.0	1.0	Site does not contain atypical vegetation.
Vwhc	0.5	0.6	Site contains same habitats listed for Vnhc.
Vcover	0.6	1.0	Site contains 97 % vegetation where not open water.
Vvegstr	1.0	1.0	Veg structure index is 56.8 for pre-project and is assumed to increase with spoil placement.

Acreage to be impacted: **1900**

Functional Capacity Unit (FCU) Calculations

	Pre-project FCI	Post-project FCI	FCI Difference	Pre-project FCU	Post-project FCU	FCU Difference
Shoreline Stabilization	0.62	0.86	-0.24	1178	1634	-456
Sediment Deposition	0.707106781	1	-0.292893219	1343.502884	1900	-556.4971157
Nutrient and Org C Exchange	1	1	0	1900	1900	0
Resident Nekton Utilization	0.9	0.971428571	-0.071428571	1710	1845.714286	-135.7142857
Nonresident nekton utiliza	0.948683298	0.985610761	-0.036927463	1802.498266	1872.660445	-70.16217886
Maintain Invert Prey Pool	0.8	1	-0.2	1520	1900	-380
Provide Wildlife Habitat	0.775	0.9	-0.125	1472.5	1710	-237.5
Maintain Char Plant Com Composition	0.6	1	-0.4	1140	1900	-760
Plant Biomass Production	1	1	0	1900	1900	0
Totals:						**-2595.87358**

Regional Tidal HGM
Port Arthur Liquefaction Project

Project area: PEM w/o invasives

	Pre	Post	Comments
Vslope	0.1	0.0	A distance of >50 meters must be reached to acquire water depths of 2 meters.
Vwidth	1.0	0.0	Avg marsh width is > 200 meters.
Vexpose	1.0	0.0	Exposure Index is = 3.9 PEM wetlands east of Hwy 87 have exposure from ship channel.
Vrough	1.0	0.0	Pre-project is scored 0.025 for bare marsh, 0.01 for topo relief, and0.035 for >76% vegetation.
Vsoil	0.8	0.0	Pre-project site contains clay loam while post project will contain fill.
Vedge	0.4	0.0	Marsh lacks water edge only steep banks to the ship channel.
Voma	0.0	0.0	The mitigation area contains no tidally connected edge.
Vsize	1.0	0.0	Area provides a continuous corridor for animal travers and has an effective patch size > 200 ha.
Vhydro	0.0	0.0	Site is isolated from tidal exchange.
Vnhc	0.2	0.0	Site only contains high marsh.
Vtypical	0.4	0.0	Site contains 36.6% typical vegetation.
Vwhc	0.4	0.0	Habitats included: high marsh, scrub-shrub, forested uplands.
Vcover	1.0	0.0	Site contains >75% cover.
Vvegstr	1.0	0.0	Veg structure index is > 30.

Acreage to be impacted: **144.1**

Functional Capacity Unit (FCU) Calculations

	Pre-project FCI	Post-project FCI	FCI Difference	Pre-project FCU	Post-project FCU	FCU Difference
Shoreline Stabilization	0.78	0.00	0.78	112.40	0.00	112.40
Sediment Deposition	0.00	0.00	0.00	0.00	0.00	0.00
Nutrient and Org C Exchange	0.00	0.00	0.00	0.00	0.00	0.00
Resident Nekton Utilization	0.14	0.00	0.14	20.59	0.00	20.59
Nonresident nekton utiliza	0.00	0.00	0.00	0.00	0.00	0.00
Maintain Invert Prey Pool	0.47	0.00	0.47	67.25	0.00	67.25
Provide Wildlife Habitat	0.70	0.00	0.70	100.87	0.00	100.87
Maintain Char Plant Com Composition	0.40	0.00	0.40	57.64	0.00	57.64
Plant Biomass Production	1.00	0.00	1.00	144.10	0.00	144.10
Totals:						**502.84**

Regional Tidal HGM
Port Arthur Liquefaction Project

Project area: PEM w/invasives

	Pre	Post	Comments
Vslope	0.1	0.0	Water depths >2metes are within 50 meters of the boundary.
Vwidth	1.0	0.0	Avg marsh width is > 200 meters.
Vexpose	1.0	0.0	Exposure Index is = 0 Site has a barrier of vegetation protecting it from wind generated waves.
Vrough	1.0	0.0	Pre-project is scored 0.025 for bare marsh, 0.01 for topo relief, and0.035 for >76% vegetation.
Vsoil	0.8	0.0	Pre-project site contains clay loam while post project will contain fill.
Vedge	0.4	0.0	Site is not marsh nor does it have any marsh/water interface.
Voma	0.0	0.0	The mitigation area contains no tidally connected edge.
Vsize	1.0	0.0	Area provides a continuous corridor for animal travers and has an effective patch size > 200 ha.
Vhydro	0.0	0.0	Site is isolated from tidal exchange.
Vnhc	0.2	0.0	Site only contains high marsh.
Vtypical	0.4	0.0	Site contains 37% typical vegetation.
Vwhc	0.4	0.0	Habitats included: high marsh, scrub-shrub, forested uplands.
Vcover	1.0	0.0	Site contains >75% cover.
Vvegstr	1.0	0.0	Veg structure index is > 30.

Acreage to be impacted: **188.89**

Functional Capacity Unit (FCU) Calculations

	Pre-project FCI	Post-project FCI	FCI Difference	Pre-project FCU	Post-project FCU	FCU Difference
Shoreline Stabilization	0.78	0.00	0.78	147.33	0.00	147.33
Sediment Deposition	0.00	0.00	0.00	0.00	0.00	0.00
Nutrient and Org C Exchange	0.00	0.00	0.00	0.00	0.00	0.00
Resident Nekton Utilization	0.14	0.00	0.14	26.98	0.00	26.98
Nonresident nekton utiliza	0.00	0.00	0.00	0.00	0.00	0.00
Maintain Invert Prey Pool	0.47	0.00	0.47	88.15	0.00	88.15
Provide Wildlife Habitat	0.70	0.00	0.70	132.22	0.00	132.22
Maintain Char Plant Com Composition	0.40	0.00	0.40	75.56	0.00	75.56
Plant Biomass Production	1.00	0.00	1.00	188.89	0.00	188.89
Totals:						**659.14**

Regional Tidal HGM
Port Arthur Liquefaction Project

Project area: PSS w/o invasives

	Pre	Post	Comments
Vslope	0.1	0.0	Water depths >2meters are within 50 meters of the boundary.
Vwidth	1.0	0.0	Avg marsh width is > 200 meters.
Vexpose	1.0	0.0	Exposure Index is = 0 Site has a barrier of vegetation protecting it from wind generated waves.
Vrough	1.0	0.0	Pre-project is scored 0.025 for bare marsh, 0.01 for topo relief, and 0.16 for >76% woody shrubs.
Vsoil	1.0	0.0	Pre-project site contains clay loam while post project will contain fill.
Vedge	0.4	0.0	Site is not marsh nor does it have any marsh/water interface.
Voma	0.0	0.0	TheThe mitigation area contains no tidally connected edge.
Vsize	1.0	0.0	Area provides a continuous corridor for animal travers and has an effective patch size > 200 ha.
Vhydro	0.0	0.0	Site is isolated from tidal exchange.
Vnhc	0.3	0.0	Site contians woody debris and low marsh.
Vtypical	0.1	0.0	Site does not contain typical vegetation.
Vwhc	0.5	0.0	Habitats included: woody debris, low marsh, scrub-shrub and forested uplands.
Vcover	0.4	0.0	Site contains >75% cover.
Vvegstr	1.0	0.0	Veg structure index is > 30.

Acreage to be impacted: **201.4**

Functional Capacity Unit (FCU) Calculations

	Pre-project FCI	Post-project FCI	FCI Difference	Pre-project FCU	Post-project FCU	FCU Difference
Shoreline Stabilization	0.82	0.00	0.82	165.15	0.00	165.15
Sediment Deposition	0.00	0.00	0.00	0.00	0.00	0.00
Nutrient and Org C Exchange	0.00	0.00	0.00	0.00	0.00	0.00
Resident Nekton Utilization	0.16	0.00	0.16	31.65	0.00	31.65
Nonresident nekton utiliza	0.00	0.00	0.00	0.00	0.00	0.00
Maintain Invert Prey Pool	0.27	0.00	0.27	53.71	0.00	53.71
Provide Wildlife Habitat	0.65	0.00	0.65	130.91	0.00	130.91
Maintain Char Plant Com Composition	0.10	0.00	0.10	20.14	0.00	20.14
Plant Biomass Production	1.00	0.00	1.00	201.40	0.00	201.40
Totals:						**602.95**

Regional Tidal HGM
Port Arthur Liquefaction Project

Project area: PSS w/invasives

	Pre	Post	Comments
Vslope	0.5	0.0	A distance of >50 meters must be reached to acquire water depths of 2 meters.
Vwidth	1.0	0.0	Avg marsh width is > 200 meters.
Vexpose	1.0	0.0	Exposure Index is = 0 Site has a barrier of vegetation protecting it from wind generated waves.
Vrough	1.0	0.0	Pre-project is scored 0.025 for bare marsh, 0.01 for topo relief, and 0.16 for >76% woody shrubs.
Vsoil	1.0	0.0	Pre-project site contains clay loam while post project will contain fill.
Vedge	0.4	0.0	Site is not marsh nor does it have any marsh/water interface.
Voma	0.0	0.0	The mitigation area contains no tidally connected edge.
Vsize	1.0	0.0	Area provides a continuous corridor for animal travers and has an effective patch size > 200 ha.
Vhydro	0.0	0.0	Site is isolated from tidal exchange.
Vnhc	0.2	0.0	Site only contains woody debris.
Vtypical	0.1	0.0	Site contains 8.8% typical vegetation.
Vwhc	0.4	0.0	Habitatsw included: site includes woody debris, scrub-shrub and forested upland.
Vcover	0.8	0.0	Site contains >75% cover.
Vvegstr	1.0	0.0	Veg structure index is > 30.

Acreage to be impacted: **216.26**

Functional Capacity Unit (FCU) Calculations

	Pre-project FCI	Post-project FCI	FCI Difference	Pre-project FCU	Post-project FCU	FCU Difference
Shoreline Stabilization	0.90	0.00	0.90	194.63	0.00	194.63
Sediment Deposition	0.00	0.00	0.00	0.00	0.00	0.00
Nutrient and Org C Exchange	0.00	0.00	0.00	0.00	0.00	0.00
Resident Nekton Utilization	0.14	0.00	0.14	30.89	0.00	30.89
Nonresident nekton utiliza	0.00	0.00	0.00	0.00	0.00	0.00
Maintain Invert Prey Pool	0.40	0.00	0.40	86.50	0.00	86.50
Provide Wildlife Habitat	0.63	0.00	0.63	135.16	0.00	135.16
Maintain Char Plant Com Composition	0.10	0.00	0.10	21.63	0.00	21.63
Plant Biomass Production	1.00	0.00	1.00	216.26	0.00	216.26
Totals:						**685.08**

ATTACHMENT D

Louisiana Rapid Assessment Method
Data Sheets and Calculations
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texas

Louisiana Wetland Rapid Assessment Method (LRAM)

CEMVN Acct #	N/A
Acres Impacted	750.65
Watershed Basin	Sabine

		Imp 1	Imp 2	Imp 3	Imp 4	Imp 5	Imp 6	Imp 7	Imp 8
Impact Factors	Wetland Status	Degraded	Degraded	Degraded	Degraded	Pick Here	Pick Here	Pick Here	Pick Here
		1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
	Habitat Condition	Med	Med	Low	Low	Pick Here	Pick Here	Pick Here	Pick Here
		2.0	2.0	1.0	1.0	0.0	0.0	0.0	0.0
	Hydrologic Condition	Low	Low	Low	Low	Pick Here	Pick Here	Pick Here	Pick Here
		1.0	1.0	1.0	1.0	0.0	0.0	0.0	0.0
	Negative Influences	High	High	High	High	Pick Here	Pick Here	Pick Here	Pick Here
		-0.5	-0.5	-0.5	-0.5	0.0	0.0	0.0	0.0
	Impact Type	Full/Perm	Full/Perm	Full/Perm	Full/Perm	Pick Here	Pick Here	Pick Here	Pick Here
		3.0	3.0	3.0	3.0	0.0	0.0	0.0	0.0
	Sum:	6.5	6.5	5.5	5.5	0.0	0.0	0.0	0.0
	Area:	144.1	188.89	201.4	216.26	0			
	Sum x Area Affected:	936.7	1227.8	1107.7	1189.4	0.0	0.0	0.0	0.0

∑ Impacts: 4461.6

		Area 1	Area 2	Area 3	Area 4	Area 5	Area 6	Area 7	Area 8
Mitigation Factors	Mitigation Type	Re-Est	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here
		6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Management	None	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Negative Influences	Med	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here
		-0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Size	>500	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here
		0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Buffer / Upland	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here	Pick Here
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sum:	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Area:	1900.0	0.0						
	Sum x Area Affected:	11400.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

∑ Mitigation: 11400.0

LRAM - Comments

Impact Factors	**Wetland Status**	Degraded wetlands due to invasive tallow, Phragmites and Iva acting as invasives leaving very little diversity.
	Habitat Condition	PEM wetlands contian invasives and PSS wetlands plants are not typical for fresh marsh.
	Hydrologic Condition	Low conditions are a result of building the site up with spoil and levees surrounding the entire area.
	Negative Influences	Build up from spoil placement, ring levees impeeding natural hydrologic flow and a highway divides wetlands.
	Impact Type	Impacts will be permanent.

Mitigation Factors	**Mitigation Type**	Will enhance degraded marsh with spoil from dredging the ship channel.
	Management	The site will be open to tidal influences and will be self sustaining.
	Negative Influences	There are old canals from oi and gas exploration that surround the project area.
	Size	Enhancement site is 1900 acres and is also a part of the existing JD Murphree WMA.
	Buffer / Upland	None

ATTACHMENT E

Texas Rapid Assessment Method
Data Sheets and Calculations
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texas

Aquatic Resource Compensation Calculator Version 1.0

Inputs

Time Horizon: 75

Project # : SWF-

Project Name: WWW

Proposed Impact Site

Impact Year: 2016

Assessment Area and Impact Type	TXRAM Score Divided by 100 Baseline Condition	TXRAM Score Divided by 100 Post-Impact	Units Ac or LF	Balance Units Ac or LF
WWW	0.54	0.00	126.04	
Reach Continued	0.54	0.00		126.04

Proposed Mitigation Site

Mitigation Area & Type	Mitigation Work Timing & Risk of Failure: Year Started	Year Matured	Failure Risk	TXRAM Score Divided by 100: Baseline	Release of Monitoring	At Maturity	Mitigation Required	Mitigation Proposed (Ac or LF)
WMA	2016	2023	5 %	0.54	0.72	0.81	260.26	

Outputs

Compensation Ratios

Mitigation : / Impact		Ratio
M vs I (1)	>=	2.06
IR vs MR2	(see note 15)	

Instructions

1) Describe the project Impacts:

a) For each Assessment Area (aquatic resource of one given type with homogenous baseline conditions), using only the gray boxes, indicate when the impact(s) would occur (i.e., Impact Year)

b) For each Assessment Area (aquatic resource of one given type with homogeneous baseline conditions) input the baseline TXRAM Score (i.e., Pre-Impact)

c) For each Assessment Area, Input the predicted TXRAM Score after the proposed impacts would occur (i.e., Post-Impact)

d) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Assessment Area associated with the proposed impact

2) Describe the proposed mitigation used to offset proposed impacts:

a) For each Mitigation Area and Type, using only the gray boxes, input the date at which time the proposed mitigation would take place (i.e., Year Started)

b) For each Mitigation Area and Type, input the predicted year at which when the mitigation project would the time at which the predicted At Maturity TXRAM Score would be achieved (i.e., Year Matured).

c) Input the estimated Risk of Failure for the each proposed mitigation activity (Mitigation Area and Type)

d) For each proposed mitigation activity, input the baseline TXRAM Score, the predicted TXRAM Score at the end of the USACE monitoring period (Release of Monitoring) and the predicted TXRAM Score at the year fully matured (At Maturity).

e) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Mitigation Area associated with the proposed compensation, indicate the linear distance of the proposed mitigation offered to offset proposed impacts

f) If necessary, (indicated by a balance > 0 in Column P), continue with additional mitigation sites

Use a separate spreadsheet for each Assessment Area (aquatic resource of one given type with homogenous baseline conditions) .

Aquatic Resource Compensation Calculator Version 1.0

Inputs

Time Horizon: 75

Project # : SWF-

Project Name: WWW

Proposed Impact Site

Impact Year: 2016

Assessment Area and Impact Type	TXRAM Score Divided by 100 Baseline Condition	TXRAM Score Divided by 100 Post-Impact	Units Ac or LF	Balance Units Ac or LF
WWW	0.53	0.00	185.58	
Reach Continued	0.53	0.00		185.58

Proposed Mitigation Site

Mitigation Area & Type	Mitigation Work Timing & Risk of Failure: Year Started	Year Matured	Failure Risk	TXRAM Score Divided by 100: Baseline	Release of Monitoring	At Maturity	Mitigation Required	Mitigation Proposed (Ac or LF)
WMA	2016	2023	5 %	0.54	0.72	0.81	376.11	

Outputs

Compensation Ratios

Mitigation : / Impact		Ratio
M vs I (1)	>=	2.03
IR vs MR2	(see note 15)	

Instructions

1) Describe the project Impacts:

a) For each Assessment Area (aquatic resource of one given type with homogenous baseline conditions), using only the gray boxes, indicate when the impact(s) would occur (i.e., Impact Year)

b) For each Assessment Area (aquatic resource of one given type with homogeneous baseline conditions) input the baseline TXRAM Score (i.e., Pre-Impact)

c) For each Assessment Area, Input the predicted TXRAM Score after the proposed impacts would occur (i.e., Post-Impact)

d) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Assessment Area associated with the proposed impact

2) Describe the proposed mitigation used to offset proposed impacts:

a) For each Mitigation Area and Type, using only the gray boxes, input the date at which time the proposed mitigation would take place (i.e., Year Started)

b) For each Mitigation Area and Type, input the predicted year at which when the mitigation project would the time at which the predicted At Maturity TXRAM Score would be achieved (i.e., Year Matured).

c) Input the estimated Risk of Failure for the each proposed mitigation activity (Mitigation Area and Type)

d) For each proposed mitigation activity, input the baseline TXRAM Score, the predicted TXRAM Score at the end of the USACE monitoring period (Release of Monitoring) and the predicted TXRAM Score at the year fully matured (At Maturity).

e) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Mitigation Area associated with the proposed compensation, indicate the linear distance of the proposed mitigation offered to offset proposed impacts

f) If necessary, (indicated by a balance > 0 in Column P), continue with additional mitigation sites

Use a separate spreadsheet for each Assessment Area (aquatic resource of one given type with homogenous baseline conditions) .

Aquatic Resource Compensation Calculator Version 1.0

Inputs

Time Horizon: 75

Project # : SWF-

Project Name: WWW

Proposed Impact Site

Impact Year: 2016

Assessment Area and Impact Type	TXRAM Score Divided by 100 Baseline Condition	TXRAM Score Divided by 100 Post-Impact	Units Ac or LF	Balance Units Ac or LF
WWW	0.50	0.00	200.87	
Reach Continued	0.50	0.00		200.87

Proposed Mitigation Site

Mitigation Area & Type	Mitigation Work Timing & Risk of Failure: Year Started	Year Matured	Failure Risk	TXRAM Score Divided by 100: Baseline	Release of Monitoring	At Maturity	Mitigation Required	Mitigation Proposed (Ac or LF)
WMA	2016	2023	5 %	0.55	0.72	0.81	395.81	

Outputs

Compensation Ratios

Mitigation : / Impact		Ratio
M vs I (1)	>=	1.97
IR vs MR2	(see note 15)	

Instructions

1) Describe the project Impacts:

a) For each Assessment Area (aquatic resource of one given type with homogenous baseline conditions), using only the gray boxes, indicate when the impact(s) would occur (i.e., Impact Year)

b) For each Assessment Area (aquatic resource of one given type with homogeneous baseline conditions) input the baseline TXRAM Score (i.e., Pre-Impact)

c) For each Assessment Area, Input the predicted TXRAM Score after the proposed impacts would occur (i.e., Post-Impact)

d) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Assessment Area associated with the proposed impact

2) Describe the proposed mitigation used to offset proposed impacts:

a) For each Mitigation Area and Type, using only the gray boxes, input the date at which time the proposed mitigation would take place (i.e., Year Started)

b) For each Mitigation Area and Type, input the predicted year at which when the mitigation project would the time at which the predicted At Maturity TXRAM Score would be achieved (i.e., Year Matured).

c) Input the estimated Risk of Failure for the each proposed mitigation activity (Mitigation Area and Type)

d) For each proposed mitigation activity, input the baseline TXRAM Score, the predicted TXRAM Score at the end of the USACE monitoring period (Release of Monitoring) and the predicted TXRAM Score at the year fully matured (At Maturity).

e) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Mitigation Area associated with the proposed compensation, indicate the linear distance of the proposed mitigation offered to offset proposed impacts

f) If necessary, (indicated by a balance > 0 in Column P), continue with additional mitigation sites

Use a separate spreadsheet for each Assessment Area (aquatic resource of one given type with homogenous baseline conditions) .

Aquatic Resource Compensation Calculator Version 1.0

Inputs

Time Horizon: 75

Project # : SWF-

Project Name: WWW

Proposed Impact Site

Impact Year: 2016

Assessment Area and Impact Type	TXRAM Score Divided by 100 Baseline Condition	TXRAM Score Divided by 100 Post-Impact	Units Ac or LF	Balance Units Ac or LF
WWW	0.53	0.00	216.06	
Reach Continued	0.53	0.00		216.06

Proposed Mitigation Site

Mitigation Area & Type	Mitigation Work Timing & Risk of Failure: Year Started	Year Matured	Failure Risk	TXRAM Score Divided by 100: Baseline	Release of Monitoring	At Maturity	Mitigation Required	Mitigation Proposed (Ac or LF)
WMA	2016	2023	5 %	0.54	0.72	0.81	437.89	

Outputs

Compensation Ratios

Mitigation : / Impact		Ratio
M vs I (1)	>=	2.03
IR vs MR2	(see note 15)	

Instructions

1) Describe the project Impacts:

a) For each Assessment Area (aquatic resource of one given type with homogenous baseline conditions), using only the gray boxes, indicate when the impact(s) would occur (i.e., Impact Year)

b) For each Assessment Area (aquatic resource of one given type with homogeneous baseline conditions) input the baseline TXRAM Score (i.e., Pre-Impact)

c) For each Assessment Area, Input the predicted TXRAM Score after the proposed impacts would occur (i.e., Post-Impact)

d) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Assessment Area associated with the proposed impact

2) Describe the proposed mitigation used to offset proposed impacts:

a) For each Mitigation Area and Type, using only the gray boxes, input the date at which time the proposed mitigation would take place (i.e., Year Started)

b) For each Mitigation Area and Type, input the predicted year at which when the mitigation project would the time at which the predicted At Maturity TXRAM Score would be achieved (i.e., Year Matured).

c) Input the estimated Risk of Failure for the each proposed mitigation activity (Mitigation Area and Type)

d) For each proposed mitigation activity, input the baseline TXRAM Score, the predicted TXRAM Score at the end of the USACE monitoring period (Release of Monitoring) and the predicted TXRAM Score at the year fully matured (At Maturity).

e) Using acres (AC) for wetlands and linear feet (LF) for streams, input the units of measure for each Mitigation Area associated with the proposed compensation, indicate the linear distance of the proposed mitigation offered to offset proposed impacts

f) If necessary, (indicated by a balance > 0 in Column P), continue with additional mitigation sites

Use a separate spreadsheet for each Assessment Area (aquatic resource of one given type with homogenous baseline conditions) .

ATTACHMENT F

Uniform Mitigation Assessment Method
Data Sheets and Calculations
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texas

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Port Arthur Liquefaction Project		Mitigation
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Marsh Enhancement	Joey Runner	8/14/2014

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support w/o pres or current: 5 — with: 9	The current mitigation site contains a large amount of open water and is deteriorating at a fast rate. Once the clayey soils are deposited throughout the area, the marsh elevation will increase, and thus have a slower rate of loss.
.500(6)(b)Water Environment (n/a for uplands) w/o pres or current: 5 — with: 9	This marsh contains 52% open water and is deteriorating at a fast rate. With the project the site will be built up and will provide an increase fish and wildlife habitat.
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community w/o pres or current: 5 — with: 9	The plant structure in this marsh is degraded and covers 48% of the project area. There is a lack of vegetation diversity at that the site as it is comprised predominanatly of *Spartina patens*. With the project the site will be raised with spoil placement and species variation will be greater.

Score = sum of above scores/30 (if uplands, divide by 20)	
current or w/o pres: 0.5	with: 0.9

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres =

Delta = [with-current]
0.4

If mitigation
Time lag (t-factor) = 1.07
Risk factor = 1

For mitigation assessment areas
RFG = delta/(t-factor x risk) = 0.263

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Port Arthur Liquefaction Project		PEM
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Impact	Joey Runner	8/14/2014

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

		w/o pres or current	with
.500(6)(a) Location and Landscape Support	The area is surrounded by levees and borders a highway making it less than an ideal location. The location is also an old spoil cell and has been impacted with sediment from the ship channel.	4	0
.500(6)(b)Water Environment (n/a for uplands)	These wetllands are surrounded by a levee system which limits hydrology and only minimally benefits wildlife.	1	0
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	Vegetation has been impacted by historical spoil placement and is no longer fresh marsh. Species noted here represent species that are found higher in elevation and more inland.	3	0

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.267	0

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 38.43

Delta = [with-current]
0.267

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Port Arthur Liquefaction Project		PEM with tallow
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Permanent Impact	Joey Runner	8/14/2014

Scoring Guidance
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed

Optimal (10)	Moderate(7)	Minimal (4)	Not Present (0)
Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support	w/o pres or current: 4	with: 0	The area is surrounded by levees and borders a highway making it less than an ideal location. The location is also an old spoil cell and has been impacted with sediment from the ship channel.
.500(6)(b)Water Environment (n/a for uplands)	w/o pres or current: 1	with: 0	These wetlands are surrounded by a levee system which limits hydrology and only minimally benefits wildlife
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	w/o pres or current: 3	with: 0	Vegetation has been impacted by historical spoil placement and is no longer fresh marsh. Species noted here represent species that are found higher in elevation and more inland. There are also invasives located within these wetlands.

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.267	0

Delta = [with-current]
0.267

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

If mitigation
Time lag (t-factor) =
Risk factor =

For impact assessment areas
FL = delta x acres = 50.37

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Port Arthur Liquefaction Project		PSS
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Impact	Joey Runner	8/14/2014

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support	w/o pres or current: 4	with: 0	The area is surrounded by levees and borders a highway, making it less than an ideal location. The location is also an old spoil cell and has been impacted with sediment from the shipo channel.
.500(6)(b)Water Environment (n/a for uplands)	w/o pres or current: 1	with: 0	These wetlands are surrounded by a levee system which limits hydrology and only minimally benefits wildlife.
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	w/o pres or current: 3	with: 0	Vegetation has been impacted by historical spoil placement and is no longer fresh marsh. Species noted here represent species that are found higher in elevation and more inland.

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.267	0

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 53.71

Delta = [with-current]
0.267

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

PART II – Quantification of Assessment Area (impact or mitigation)
(See Sections 62-345.500 and .600, F.A.C.)

Site/Project Name	Application Number	Assessment Area Name or Number
Port Arthur Liquefaction Project		PSS tallow
Impact or Mitigation	**Assessment conducted by:**	**Assessment date:**
Impact	Joey Runner	8/14/2014

Scoring Guidance	**Optimal (10)**	**Moderate(7)**	**Minimal (4)**	**Not Present (0)**
The scoring of each indicator is based on what would be suitable for the type of wetland or surface water assessed	Condition is optimal and fully supports wetland/surface water functions	Condition is less than optimal, but sufficient to maintain most wetland/surface waterfunctions	Minimal level of support of wetland/surface water functions	Condition is insufficient to provide wetland/surface water functions

.500(6)(a) Location and Landscape Support	w/o pres or current: 4	with: 0	The area is surrounded by levees and borders a highway making it less than an ideal location. The location is also an onld spoil cell and has been impacted with sediment from the ship channel.
.500(6)(b)Water Environment (n/a for uplands)	w/o pres or current: 1	with: 0	These wetlands are surrounded by a levee system which limits hydrology and only minimally benefits wildlife.
.500(6)(c)Community structure 1. Vegetation and/or 2. Benthic Community	w/o pres or current: 3	with: 0	Vegetation has been impacted by historical spoil placement and is no longer fresh marsh. Species noted here represent species that are found higher in elevation and more inland. There are also invasives located within these wetlands.

Score = sum of above scores/30 (if uplands, divide by 20)	current or w/o pres	with
	0.267	0

If preservation as mitigation,
Preservation adjustment factor =
Adjusted mitigation delta =

For impact assessment areas
FL = delta x acres = 57.67

Delta = [with-current]
0.267

If mitigation
Time lag (t-factor) =
Risk factor =

For mitigation assessment areas
RFG = delta/(t-factor x risk) =

ATTACHMENT G

Wetland Value Assessment
Data Sheets and Calculations
Mitigation Plan
Port Arthur Liquefaction Project
Jefferson County, Texas

WETLAND VALUE ASSESSMENT COMMUNITY MODEL

V2.4

Brackish Marsh

Project: Port Arthur Liquefaction Project

FWOP

AAHUs = 695.91

Project Area (ac)	1900	1900	1900	1900	1900	1900						
Target Year (TY)	0	1	3	5	20	50						
V1: % Emergent	52	52	51	50	45	37						
V2: % Aquatic	10	10	10	10	10	10						
V3: Interspersion Class 1	0	0	0	0	0	0						
V3: Interspersion Class 2	0	0	0	0	0	0						
V3" Interspersion Class 3	100	100	100	100	100	100						
V3: Interspersion Class 4	0	0	0	0	0	0						
V3: Interspersion Class 5	0	0	0	0	0	0						
V4: %OW <= 1.5ft	0	0	0	0	0	0						
V5: Salinity (ppt)	2	2	2	2	2	2						
V6: Access Value	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000						

FWP

Project Area (ac)	1,900	1900	1900	1900	1900	1900						
Target Year (TY)	0	1	3	5	20	50						
V1: % Emergent	52	50	100	99	94	85						
V2: % Aquatic	10	5	5	5	5	5						
V3: Interspersion Class 1	0	100	100	100	100	0						
V3: Interspersion Class 2	0	0	0	0	0	100						
V3" Interspersion Class 3	100	0	0	0	0	0						
V3: Interspersion Class 4	0	0	0	0	0	0						
V3: Interspersion Class 5	0	0	0	0	0	0						
V4: %OW <= 1.5ft	0	50	0	1	6	15						
V5: Salinity (ppt)	2	2	2	2	2	2						
V6: Access Value	1	0.0001	1.0000	1.0000	1.0000	1.0000						

Computed SIs

FWOP SIs

Project Area (ac)	1,900	1,900	1,900	1,900	1,900	1,900						
Target Year (TY)	0	1	3	5	20	50						
V1: % Emergent	0.57	0.57	0.56	0.55	0.51	0.43						
V2: % Aquatic	0.19	0.19	0.19	0.19	0.19	0.19						
V3 Interspersion	0.40	0.40	0.40	0.40	0.40	0.40						
V4: %OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10	0.10						
V5: Salinity (ppt)	1.00	1.00	1.00	1.00	1.00	1.00						
V6: Access Value	1.00	1.00	1.00	1.00	1.00	1.00						
Emergent Marsh HSI =	**0.66**	**0.66**	**0.65**	**0.65**	**0.62**	**0.56**						
Open Water HSI =	**0.40**	**0.40**	**0.40**	**0.40**	**0.40**	**0.40**						

FWP SIs

Project Area (ac)	1,900	1,900	1,900	1,900	1,900	1,900						
Target Year (TY)	0	1	3	5	20	50						
V1: % Emergent	0.57	0.55	1.00	0.99	0.95	0.87						
V2: % Aquatic	0.19	0.15	0.15	0.15	0.15	0.15						
V3 Interspersion	0.40	1.00	1.00	1.00	1.00	0.60						
V4: %OW <= 1.5ft	0.10	0.74	0.10	0.11	0.18	0.29						
V5: Salinity (ppt)	1.00	1.00	1.00	1.00	1.00	1.00						
V6: Access Value	1.00	0.10	1.00	1.00	1.00	1.00						
Emergent Marsh HSI =	**0.66**	**0.51**	**1.00**	**0.99**	**0.97**	**0.87**						
Open Water HSI =	**0.40**	**0.30**	**0.40**	**0.40**	**0.41**	**0.38**						

AAHU CALCULATION - EMERGENT MARSH

Project: Port Arthur Liquefaction Project

FWOP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1,900	0	988	0.66	651.02	
1,900	1	988	0.66	651.02	651.02
1,900	3	969	0.65	632.55	1283.53
1,900	5	950	0.65	614.28	1246.79
1,900	20	855	0.62	526.17	8546.02
1,900	50	703	0.56	396.56	13801.95
	Max=	50		AAHUs =	510.59

FWP Project Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1,900	0	988	0.66	651.02	
1,900	1	950	0.51	485.38	567.27
1,900	3	1900	1.00	1900.00	2230.51
1,900	5	1881	0.99	1870.86	3770.83
1,900	20	1786	0.97	1727.93	26984.50
1,900	50	1615	0.87	1410.63	46997.96
	Max=	50		AAHUs	1611.02

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs =	1611.02
B. Future Without Project Emergent Marsh AAHUs =	510.59
Net Change (FWP - FWOP) =	**1100.43**

AAHU CALCULATION - OPEN WATER

Project: Port Arthur Liquefaction Project

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
1,900	0	912	0.40	363.21	
1,900	1	912	0.40	363.21	363.21
1,900	3	931	0.40	370.78	733.99
1,900	5	950	0.40	378.35	749.13
1,900	20	1045	0.40	416.18	5958.97
1,900	50	1197	0.40	476.72	13393.50
	Max=	50		AAHUs =	423.98

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
1,900	0	912	0.40	363.21	
1,900	1	950	0.30	285.40	324.93
1,900	3	0	0.40	0.00	316.84
1,900	5	19	0.40	7.61	7.61
1,900	20	114	0.41	46.22	402.61
1,900	50	285	0.38	109.55	2354.50
	Max=	50		AAHUs	68.13

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs =	68.13
B. Future Without Project Open Water AAHUs =	423.98
Net Change (FWP - FWOP) =	-355.85

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	1100.43
B. Open Water Habitat Net AAHUs =	-355.85
Net Benefits= (2.6xEMAAHUs+OWAAHUs)/3.6	695.91

WETLAND VALUE ASSESSMENT COMMUNITY MODEL V2.4

Fresh/Intermediate Marsh

Project: Port Arthur Liquefaction Project

AAHUs = -380.24

FWOP

Project Area (ac)	751	751	751	751	751	751	751					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0	0	0	0	0	0	0					
Target Year (TY)	0	1	3	5	10	20	50					
V1: % Emergent	100	100	100	100	100	100	100					
V2: % Aquatic	0	0	0	0	0	0	0					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	0	0	0	0	0	0	0					
V3: Interspersion Class 4	0	0	0	0	0	0	0					
V3: Interspersion Class 5	100	100	100	100	100	100	100					
V4: %OW <= 1.5ft	0	0	0	0	0	0	0					
V5: Salinty (ppt) - Fresh	0	0	0	0	0	0	0					
V5: Salinty (ppt) - INT												
V6: Fish Access - Fresh	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
V6: Fish Access - INT												

FWP

Project Area (ac)	751	43	43	43	43	43	43					
% Fresh	100	100	100	100	100	100	100					
% Intermediate	0	0	0	0	0	0	0					
Target Year (TY)	0	1	3	5	10	20	50					
V1: % Emergent	100	0	0	0	0	0	0					
V2: % Aquatic	0	0	0	0	0	0	0					
V3: Interspersion Class 1	0	0	0	0	0	0	0					
V3: Interspersion Class 2	0	0	0	0	0	0	0					
V3: Interspersion Class 3	0	0	0	0	0	0	0					
V3: Interspersion Class 4	0	0	0	0	0	0	0					
V3: Interspersion Class 5	100	100	100	100	100	100	100					
V4: %OW <= 1.5ft	0	0	0	0	0	0	0					
V5: Salinty (ppt) - Fresh	0	0	0	0	0	0	0					
V5: Salinty (ppt) - INT	0	6	6	6	6	6	6					
V6: Fish Access - Fresh	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
V6: Fish Access - INT	0.00	0.0600	0.0600	0.0600	0.0600	0.0600	0.0600					

Computed SIs

FWOP SIs

Target Year (TY)	0	1	3	5	10	20	50					
% Emergent	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
% Aquatic	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
%OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
Salinity (ppt) fresh intermediate	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
Access Value fresh intermediate	0.30	0.30	0.30	0.30	0.30	0.30	0.30					
Emergent Marsh HSI =	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**	**0.76**					
Open Water HSI =	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**					

FWP SIs

Target Year (TY)	0	1	3	5	10	20	50					
% Emergent	1.00	0.10	0.10	0.10	0.10	0.10	0.10					
% Aquatic	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
Interspersion Class 1 Class 2 Class 3 Class 4 Class 5	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
%OW <= 1.5ft	0.10	0.10	0.10	0.10	0.10	0.10	0.10					
Salinity (ppt) fresh intermediate	1.00	1.00	1.00	1.00	1.00	1.00	1.00					
Access Value fresh intermediate	0.30	0.30	0.30	0.30	0.30	0.30	0.30					
Emergent Marsh HSI =	**0.76**	**0.22**	**0.22**	**0.22**	**0.22**	**0.22**	**0.22**					
Open Water HSI =	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**	**0.19**					

AAHU CALCULATION - EMERGENT MARSH

Project: Port Arthur Liquefaction Project

FWOP Project

	Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
1	750.65	0	750.65	0.76	569.44	
2	750.65	1	750.65	0.76	569.44	569.44
3	750.65	3	750.65	0.76	569.44	1138.87
4	750.65	5	750.65	0.76	569.44	1138.87
5	750.65	10	750.65	0.76	569.44	2847.18
6	750.65	20	750.65	0.76	569.44	5694.37
7	751	50	751	0.76	569.701	17087.08
9						
10						
11						
12						
		Max=	50		AAHUs =	569.52

FWP Project

Area (ac)	TY	Marsh Acres	x HSI	Total HUs	Cum. HUs
750.65	0	750.65	0.76	569.44	
43	1	0	0.22	0.00	216.79
43	3	0	0.22	0.00	0.00
43	5	0	0.22	0.00	0.00
43	10	0	0.22	0.00	0.00
43	20	0	0.22	0.00	0.00
43	50	0	0.22	0.00	0.00
	Max=	50		AAHUs	4.34

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Emergent Marsh AAHUs =	4.34
B. Future Without Project Emergent Marsh AAHUs =	569.52
Net Change (FWP - FWOP) =	-565.18

AAHU CALCULATION - OPEN WATER

Project: Port Arthur Liquefaction Project

FWOP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
750.65	0	0	0.19	0.00	
750.65	1	0	0.19	0.00	0.00
750.65	3	0	0.19	0.00	0.00
750.65	5	0	0.19	0.00	0.00
750.65	10	0	0.19	0.00	0.00
750.65	20	0	0.19	0.00	0.00
751	50	0	0.19	0.00	0.00
	Max=	50		AAHUs =	0.00

FWP Project Area (ac)	TY	Water Acres	x HSI	Total HUs	Cum. HUs
750.65	0	0	0.19	0.00	
43	1	43	0.19	8.22	4.11
43	3	43	0.19	8.22	16.45
43	5	43	0.19	8.22	16.45
43	10	43	0.19	8.22	41.12
43	20	43	0.19	8.22	82.24
43	50	43	0.19	8.22	246.71
	Max=	50		AAHUs	8.14

NET CHANGE IN AAHUs DUE TO PROJECT

A. Future With Project Open Water AAHUs =	8.14
B. Future Without Project Open Water AAHUs =	0.00
Net Change (FWP - FWOP) =	**8.14**

TOTAL BENEFITS IN AAHUs DUE TO PROJECT

A. Emergent Marsh Habitat Net AAHUs =	-565.18
B. Open Water Habitat Net AAHUs =	8.14
Net Benefits=(2.1xEMAAHUs+OWAAHUs)/3.1	**-380.24**